
बैच टाइप कंक्रीट मिक्सर के लिए
सामान्य अपेक्षाएँ
(तीसरा पुनरीक्षण)

**General Requirements for Batch
Type Concrete Mixers**
(*Third Revision*)

ICS 91.220

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FOREWORD

This Indian Standard (Third Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Construction Plant and Machinery Sectional Committee had been approved by the Mechanical Engineering Division Council.

Batch mixers are widely used machines for concrete mixing. Concrete mix obtained by this mixer is collected batch by batch and time by time. So, it is called as batch mixer. After pouring all the materials into pan or drum, it mixes all of those for some time and finally discharges. This process is repeated until required amount of concrete mix is obtained.

This standard was originally published in 1961 and subsequently revised in 1968 and 1985. The major changes in this revision are:

- a) Reference of Indian standards has been mentioned; and
- b) Minimum thickness of shell and quality of material for respective size of mixer has been defined.

The composition of the Committee responsible for the formulation of this standard is given in Annex B.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*). The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

GENERAL REQUIREMENTS FOR BATCH TYPE CONCRETE MIXERS

(Third Revision)

1 SCOPE

1.1 This standard lays down requirements regarding the drum, water tanks and fittings, loaders, hoppers, power units, discharge height, roadworthiness, etc., for the free fall (drum) batch type concrete mixers.

1.2 The continuous mixer, forced action (pan) type mixer and truck mounted mixer are not covered in this standard.

2 REFERENCES

The standards given in Annex A are necessary adjuncts to this standard and contain provisions which through reference in this text, constitute provisions of the standards. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards.

3 TERMINOLOGY

For the purpose of this standard, the definitions given in IS 11386 shall apply.

4 DESIGNATION OF SIZE AND TYPE

The size of a batch type concrete mixer shall be designated by the number representing its nominal batch capacity in litres together with the letter *T* to indicate the tilting type, the letters *NT* to indicate non-tilting type or the letter *R* for reversing type.

Thus a mixer having a nominal batch capacity of 200 litres will have the designation 200 *T* if it is of tilting type, 200 *NT* if it is of the non-tilting type, or 200 *R* if it is of reversing type.

5 SIZES

5.1 Concrete mixers shall be of the following sizes:

- a) *Tilting Type* — 100 T, 140 T and 200 T.
- b) *Non-tilting Type* — 200 NT, 280 NT, 375 NT, 500 NT and 1 000 NT.
- c) *Reversing Type* — 200 R, 280 R, 375 R, 500 R and 1 000 R.

5.1.1 Margin of Capacity

Mixers, when operating on level sites, shall be capable of holding and mixing an actual mixing batch 10 percent in excess of the nominal mixed batch capacity mentioned in **5.1**.

5.2 Sizes other than those specified in **5.1** may be supplied by mutual agreement between the purchaser and the supplier.

6 DRUM

6.1 The size of the drum shall be such that the ratio of the total interior drum volume (geometric solid) to the nominal size of the mixer is not less than the appropriate value given in Table 1.

**Table 1 Minimum Ratio of Drum Volume to
Nominal Sizes for the Preferred Sizes of
Free-Fall Mixer**

(Clause 6.1)

Sl No.	Nominal Size of Mixer (T, NT or R) Litres	Minimum Ratio of Total Interior Drum Volume to Nominal Size of the Mixer		
i)	100	2.5	—	—
ii)	140	2.5	—	—
iii)	200	2.5	4.0	4.5
iv)	280	—	4.0	4.5
v)	375	—	4.0	4.4
vi)	500	—	3.9	4.3
vii)	1 000	—	3.8	4.2

6.2 The quality of material used in the construction of mixing drum and minimum thickness of drum for various sizes of concrete mixer shall be as per Table 2 A and Table 2 B.

6.3 Drum Speed

The manufacturer shall indicate the drum speed at which the mixer should normally be operated to give optimum performance (*see 19*).

6.3.1 If required, a revolution counter may also be provided for guiding the operator.

6.4 In case of tilting drum type mixers, the angle at which the drum operates shall vary from 20° to 30°.

Table 2 A Tilting Type Mixer

(Clause 6.2)

Sl No.	Size of the Mixer (Litres)	Minimum Thickness of Shell and Quality of Material			Blade Thickness
		Upper Conical Portion of Mixer Drum	Cylindrical Portion of Mixer Drum	Lower Portion of Mixer Drum	
(1)	(2)	(3)	(4)	(5)	(6)
i)	100 140 200	4 mm thick steel sheet conforming to IS 2062 of grade designation E 250, quality C.	6 mm thick steel sheet conforming to IS 2062 of grade designation E 350, quality A.	12 mm thick cast iron conforming to grade FG 300 of IS 210 or 8 mm thick steel conforming to IS 2062 of grade designation E 350, quality A.	8 to 10 mm thick steel conforming to IS 2062 of grade designation E 250, quality C.

Table 2 B Non-Tilting Type Mixers or Reversing Drum Mixers

(Clause 6.2)

Sl No.	Size of the Mixer (Litres)	Minimum Thickness of Shell and Quality of Material		Blade Thickness
		(3)	(4)	
(1)	(2)	(3)	(4)	(4)
i)	200	5 mm thick steel sheet conforming to IS 2062 of grade designation E 250, quality C.	5 mm thick steel sheet conforming to IS 2062 of grade designation E 250, quality C.	
ii)	280 375 500	8 mm thick steel sheet conforming to IS 2062 of grade designation E 250, quality C or 6 mm thick steel conforming to IS 2062 of Grade Designation E 350, Quality A.	8 mm thick steel sheet conforming to IS 2062 of grade designation E 250, quality C or 6 mm thick steel conforming to IS 2062 of grade designation E 350, quality A.	
iii)	1 000	12 mm thick steel sheet conforming to IS 2062 of grade designation E 250, quality C or 8 mm thick structural steel conforming to IS 2062 of grade designation E 350, quality A.	12 mm thick steel sheet conforming to IS 2062 of grade designation E 250, quality C or 8 mm thick steel conforming to IS 2062 of grade designation E 350, quality A.	

7 WATER SYSTEM

One of the types of water measuring devices is described in 7.1 and 7.2 with the fittings which shall be fixed with each mixer of 200 litres size or larger. Where required, the system and all associated equipment shall operate satisfactorily with water of any temperature up to 90°C. The system shall be manually operated or automatic, as specified. The water measurement shall be expressed in litres. Provision shall be made to facilitate the checking of the accuracy of water system.

7.1 Water Tanks

7.1.1 The tanks shall be capable of holding and delivering at least the quantities of water specified in column 3 of Table 3. The gauge or other device for indicating the quantity of water in or leaving the tank shall be accurate to within ± 2 percent of the indicated quantity above the minimum quantity of water shown in column 4 of Table 3.

7.1.2 Automatic tanks shall be capable of delivering the minimum quantity of water shown in column 4 of Table 3, and any quantity between this and the total capacity in increments as shown in column 5 of Table 3. The

scale should be graduated in increments as shown in column 5 of Table 3. The quantity delivered shall not vary from the predetermined quantity by more than ± 2 percent of the indicated quantity above the minimum quantity of water shown in column 4 of Table 3. The gauge or other device shall be so positioned that it can be conveniently read by the operator.

Table 3 Capacity of Tanks and Increments of Discharge

(Clauses 7.1.1, 7.1.2 and 7.1.3)

Sl. No.	Size of the Mixer (T, NT or R) (Litres)	Minimum Capacity of Tanks (Litres)	Automatic Tanks Only	
			Minimum Initial Discharge (Litres)	Increment of Discharge (Litres)
(1)	(2)	(3)	(4)	(5)
i)	200	35	7	1
ii)	280	55	10	1
iii)	375	65	10	1
iv)	500	75	15	1
v)	1 000	150	25	2

7.1.3 Measuring tanks, whether automatic or non-automatic and their fittings shall be such that the total time cycle for feeding the tank under the lowest pressure specified in 7.1.1, with the quantities specified in column 3 of Table 3 and for discharging these quantities into the mixer, does not exceed two minutes and the time for discharging these quantities shall not exceed half of the minimum mixing time.

7.2 Water Meters

7.2.1 The water meters shall conform to IS 779 or IS 2373.

7.2.2 Plants with capacity of 1 000 litres may be provided with automatic cut-off arrangement after predetermined water has been added to the mixer.

7.2.3 The face of the meter shall be suitably protected.

7.3 Working Pressures

7.3.1 Pressure type water measuring tanks and their fittings shall be able to operate satisfactorily with any working pressure between the limits of 0.1 and 0.7 Mpa. The tank itself shall satisfactorily withstand a test pressure of 1.05 Mpa.

7.3.2 Fittings other than those for closed tanks which have to operate under mains pressure shall be suitable for working between the limits of 0.1 and 0.7 Mpa.

7.3.3 Water meters and their fittings shall be able to operate satisfactorily with any working pressure between the limits 0.07 and 0.7 Mpa or at such lower pressure as may be stated.

7.4 Water Supply Connections

The sizes of water supply connections shall be as specified in Table 4.

Table 4 Size of Water Supply Connections
(Clauses 7.4 and 7.5)

Sl. No.	Nominal Size of Mixer (T, NT or R)	Size of Water Supply Connection
	Litres	Mm
(1)	(2)	(3)
i)	100	20
ii)	140	20
iii)	200	20
iv)	280	20
v)	375	25
vii)	500	25
viii)	1 000	30

7.5 Water Supply Pump

Hand or power pumps, when fitted, shall be of sufficient capacity to ensure that the time taken for feeding the water tank with the quantities specified in column 2 of Table 4 is less than one minute.

8 POWER LOADER

As an alternative to the fixed batch hopper (*see* 9) mixers of 140 T and 200 NT size and larger may, when required, be fitted with a power loader complying with the following requirements:

- The hopper shall be of adequate capacity to receive and discharge the maximum nominal batch of unmixed materials without spillage under normal operating conditions on a level site.

NOTE — For the purpose of this clause, the volume of the maximum nominal batch of unmixed materials is 50 percent greater than the nominal mixed batch capacity (*see* 3, 4 and 5)

- The minimum inside width of the feeding edge of the hopper shall be as specified in Table 5 (*see* Fig. 1D).

Table 5 Width of Hopper Feeding Edges
[Clauses 8 (b)]

Sl No.	Nominal Size of Mixer (N, NT or R)	Minimum Inside Width of Hopper Feeding Edge
	Litres	Metres
(1)	(2)	(3)
i)	140	1.0
ii)	200	1.1
iii)	280	1.2
iv)	375	1.4
v)	500	1.5
vi)	1 000	2.0

- The design of the loader shall allow the loading hopper to be elevated to such a height that the centre line of the chute plate of the hopper, when in discharge position, is at an angle of not less than 50° to the horizontal (*see* Fig. 1B). A mechanical device to aid discharge of the contents as quickly as possible, from the hopper to the drum may also be provided. Even when a mechanical device is provided, it is recommended that the angle of centre line of the chute plate of the hopper, when in discharge position, should be as large as practicable, preferably not less than 40° to the horizontal.
- When the means for raising and lowering the loading hopper includes flexible wire ropes winding on to a drum or drums, the method of

fastening the wire rope to the drum shall be such as to avoid, as far as possible, any tendency to cut the strands of the rope, and the fastening should preferably be positioned clear of the barrel of the drum, for example, outside the drum flange. When the loading hopper is lowered to its normal loading position, there should be at least one and a half turns of rope on the drum.

- e) Clutch, brake and hydraulic control lever shall be designed so as to prevent displacement by vibration or by accidental contact with any person.
- f) The clutch and brake control arrangement shall be so designed that the operator can control the falling speed of the loader.
- g) A safety device shall be provided to secure the hopper in the raised position when not in use.

9 FIXED BATCH HOPPER

9.1 When required, a fixed batch hopper with an outlet door for feeding the drum shall be fixed. The hopper shall be of adequate capacity to receive and discharge the maximum nominal batch of unmixed materials without spillage, under normal operating conditions on a level site.

NOTE — For the purpose of this clause, the volume of the maximum nominal batch of unmixed materials is 50 percent greater than the nominal mixed batch capacity (see 3, 4 and 5).

9.2 Except when a mechanical device to aid discharge is provided, the centre line of the chute plate of the hopper shall be at an angle of not less than 50° to the horizontal (see Fig. 1B).

9.3 The inside of the hopper shall be free from internal projections, such as rivet heads and the like.

10 INTEGRAL WEIGHER

10.1 The weighing mechanism may be fitted integrally with mixer to enable the ingredients of mix to be weighed while being loaded into the mixer hopper. The weighing mechanism and indicator shall be such that the error in excess or deficiency in all stages of loading shall be not more than two percent under normal working conditions.

10.1.1 For the purposes of weighing, the mixer shall be leveled properly.

11 INTEGRAL DRAG FEEDER

The mechanical feeder may be fitted integrally with the mixer to provide power feeding of aggregates into the mixer hopper. If the feeder is of the rope-handled scoop type, hand guided by an operator other than the mixer operator, the control mechanism shall be of the 'fail-to-safe' type.

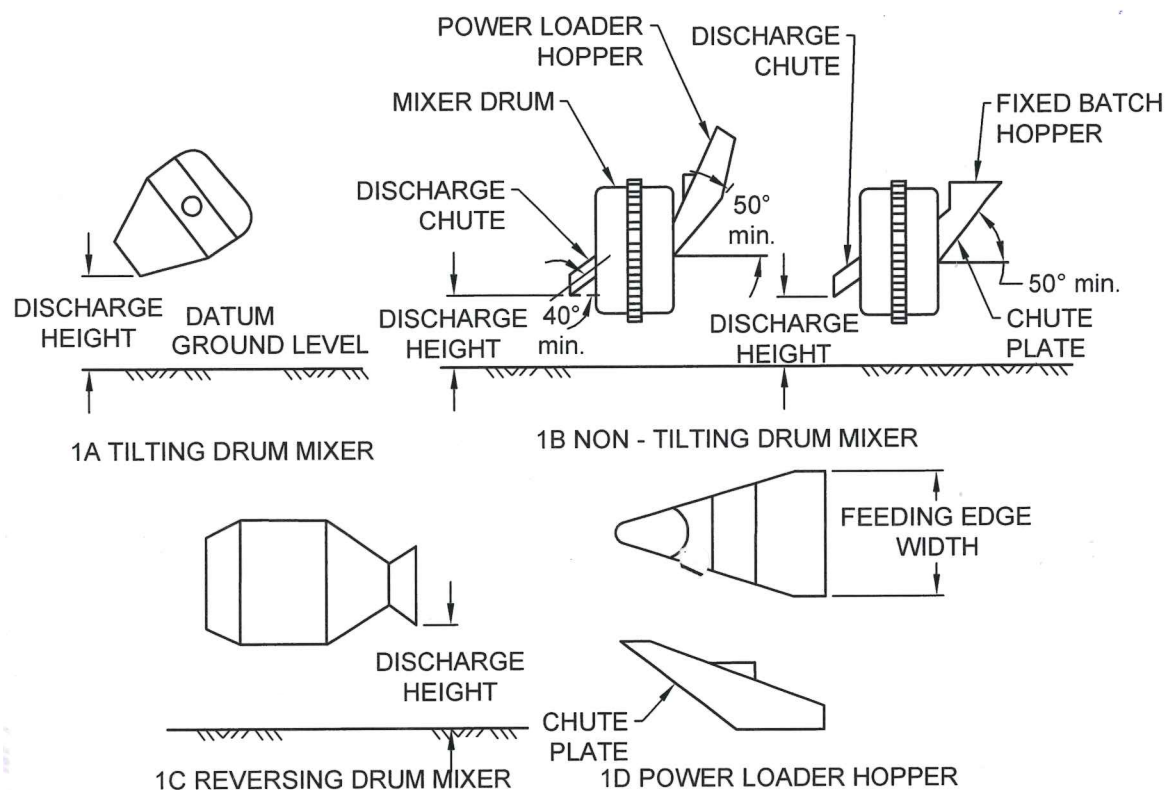


FIG. 1 DIAGRAM INDICATING NOMENCLATURE OF CONCRETE MIXTURE

12 DISCHARGE HEIGHT

12.1 The minimum distance from discharge point of any mixer to the datum ground level shall be as specified in Table 6 (see Fig. 1).

Table 6 Discharge Heights
(Clauses 12.1 and 12.2)

Sl. No.	Minimum Height of Discharge Point			
	Size of Mixer (T, NT or R)	Tilting and Non-tilting Type (T and NT)	Reversing Drum Type (R)	High Discharge Type
	Litres	cm	cm	cm
(1)	(2)	(3)	(4)	(5)
i)	100	60	—	—
ii)	140	60	—	150
iii)	200	70	70	150
iv)	280	75	75	150
v)	375	75	120	150
vi)	500	85	120	150
vii)	1 000	85	150	180

12.2 Portable mixers commonly known as ‘high discharge’ models may be supplied and the minimum distance of the discharge point of such mixers to the datum ground level shall be as specified in column 5 of Table 6.

NOTE — The horizontal distance from the tip of the chute to the nearest point on the machine shall be mentioned by the manufacturer.

13 ANGLE OF DISCHARGE CHUTES

Movable discharge chutes on non-tilting type mixers shall be such that the centre line of the chute plate is at an angle of not less than 40° to the horizontal when in the discharge position. This minimum angle shall also apply to fixed discharge chute extensions when fitted. The chute shall be self-locking in both the extreme positions. .

NOTE — It is desirable that the angle should, wherever practical, be increased.

14 TRAVELLING WHEELS

14.1 Mixers may be fitted with:

- metal or rubber tyred wheels for towing at slow speeds;
- flanged metal wheels for travelling on rails; or
- pneumatic road wheels, complete with ball or roller bearings and hubs, for towing at higher speeds.

The design of mixer shall be such as to facilitate stable parking of the mixer during mixing operation in the field. Where so required, parking brakes may

be provided for the mixers fitted with any of the three types of wheels. Suitable braking arrangement for reducing the speed shall be provided for mixers fitted with wheels of type (b) and (c). When the mixer is fitted with pneumatic tyred road wheels, means shall be provided for relieving the wheels of excessive load and also for stabilizing the machine when in operation.

14.1.1 If so required, the mixer may also be provided with ACKERMAN steering device or any other equally suitable device to ensure free steering of the front wheel/wheels of the mixer.

15 POWER UNITS

Mixers may have suitable integral power units or means of connection to an external power unit. The normal power units envisaged are internal combustion engines (petrol, diesel and gas), electric motors, hydraulic motors and air motors. Integral power units and normal power units shall comply with relevant Indian Standards. The rating in terms of kilowatts and revolutions per minute shall be stated on a plate affixed to the power unit. The power unit shall be fixed on shock-free frame. The power unit shall be mounted in such a way as to be easily removable and adjustable.

16 TOWING BARS

The mixer shall be provided with towing bar having circular eyes and suitable for motorized towing.

17 LIFTING ARRANGEMENTS

Each mixer shall be fitted with eyes, shackles or other suitable means for lifting by a slinging chain or chains.

18 TOOLS AND OPERATING INSTRUCTIONS

A strong tool box, with lock and key, containing the necessary tools for normal running adjustments and lubrication together with an inventory of the tools, shall be provided with each machine. Operating and maintenance instructions and a spare parts list shall also be provided.

19 RATING PLATE

Each mixer shall have a rating plate firmly attached to some part not easily removable. The rating plate shall have clearly marked on it the following information:

- Manufacturer's name;
- Machine reference No.;
- Size of mixer, in litres;
- Total mass, in kg;
- Drum speed, revolutions/minute;
- Motor or engine speed, revolutions/minute;

- g) Power input required to run the mixer under the normal working conditions;
- h) Maximum towing speed;
- j) Year of manufacture; and
- k) The horizontal distance from tip of the chute to the nearest point on the machine in case of portable mixer.

20 MIXING EFFICIENCY

20.1 The mixer shall be tested under normal working conditions (*see 6.3*) in accordance with the method specified in IS 4634 with a view to checking its ability to mix the ingredients to obtain a concrete having uniformity within the prescribed limits. The uniformity of mixed concrete shall be evaluated by finding the percentage variation in quantity (mass in water) of cement, fine aggregates and coarse aggregates in a freshly mixed batch of concrete.

20.1.1 The percentage variation between the quantities of cement, fine aggregates and coarse aggregates (as found by weighing in water) in the two halves of a batch and the average of the two halves of the batch shall not be more than the following limits:

Cement	8 percent
Fine aggregate	6 percent
Coarse aggregate	5 percent

21 BIS CERTIFICATION MARKING

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act, 2016* and the Rules and Regulations framed thereunder, and the product(s) may be marked with the Standard Mark.

ANNEX A

(Clause 2)

LIST OF REFERRED INDIAN STANDARDS

<i>IS No.</i>	<i>Title</i>	<i>IS No.</i>	<i>Title</i>
210 : 2009	Gray iron casting (<i>fifth revision</i>)	779 : 1994	Water meters (domestic type) (<i>sixth revision</i>)
11386 : 1985	Glossary of terms relating to concrete mixers	2373 : 1981	Water meters (bulk type) (<i>third revision</i>)
2062 : 2011	Hot rolled medium and high tensile structural steel (<i>seventh revision</i>)	4634 : 1991	Methods for testing performance of batch-type concrete mixers (<i>first revision</i>)

ANNEX B*(Foreword)***COMMITTEE COMPOSITION**

Construction Plant and Machinery Sectional Committee, MED 18

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Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards: Monthly Additions'.

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Amendments Issued Since Publication

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